

Mathematics

The mathematics curriculum at Oak Middle School, Connected Math 2, is aligned with the Massachusetts Curriculum Frameworks and the Standards of the National Council of Teachers of Mathematics (NCTM). Mathematics at Oak Middle School provides a standards-based, integrated math experience that spans all five learning strands: number sense and operations; patterns, functions, and algebra; geometry; measurement; and data analysis, statistics, and probability. The math program also serves as a vital link between Everyday Mathematics of Grades K - 6 and the Core Plus program of Grade 9 - 12.

The Connected Math program (CMP2) is based on research about how students learn best, focuses on major themes at the middle school level, and provides a student-centered approach with ongoing assessment. The goal of the Connected Math Program is that all students should be able to reason and communicate proficiently in mathematics. They should have knowledge of and skill in the use of the vocabulary, forms of representation, materials, tools, techniques, and intellectual methods of the discipline of mathematics, including the ability to define and solve problems with reason, insight, inventiveness and proficiency (<http://connectedmath.msu.edu/>).

Problem solving, communication, connections, and reasoning are integral parts of each topic of instruction. The students actively participate in the lessons using a variety of tools, including graphing calculators. Teachers utilize both formative and summative assessment to check for student understanding. Through the use of open response questions, students are building on their ability to explain their mathematical thinking process in preparation for MCAS testing.

The following sections describe the specific standards at each grade level and their corresponding CMP Unit.

Grade 7 Mathematics Standards and Units

Standard 1: Solves problems in both mathematical and everyday contexts

- Defines problems with reason and insight
- Uses appropriate materials, tools, and techniques
- Solves with inventiveness and proficiency
- Identifies reasonableness of solutions
- Identifies errors and steps to correct them

Standard 2: Communicates mathematical thinking clearly and concisely

- Uses appropriate vocabulary

- Uses appropriate forms of representation
- Identifies the steps involved in problem solving

Standard 3: Uses tables, graphs, and equations to solve problems (Variables and Patterns)

- Identifies variables in situations
- Identifies and describes patterns of change shown in words, tables, and graphs
- Constructs tables and graphs to display relationships between variables
- Uses patterns in data to make predictions about values between and beyond given data values
- Tells the “story” shown in a graph
- Writes equations to represent relationships between variables

Standard 4: Uses scale factors and ratios to describe relationships of similar figures (Stretching and Shrinking)

- Identifies similar figures by comparing corresponding parts
- Constructs similar polygons
- Contrasts similar figures with non-similar figures
- Draws shapes on coordinate grids and use coordinate rules to stretch and shrink those shapes
- Understands the role of multiplication and the term scale factor
- Predicts the ways that stretching and shrinking a figure affects lengths, angle measures, perimeters, and areas
- Uses ratios and other properties of similarity to find distances and heights

Standard 5: Applies proportional reasoning to solve comparison problems (Comparing and Scaling)

- Uses informal language to ask comparison questions
- Chooses an appropriate method to make comparisons among quantities using ratios, percents, fractions, rates, or differences
- Finds equivalent forms of given ratios and rates to scale comparisons up and down
- Finds and interpret unit rates and use them to make comparisons
- Uses unit rates to write an equation to represent a pattern in a table of data
- Sets up and solves proportions

Standard 6: Solves problems involving positive and negative numbers (Accentuate the Negative)

- Uses appropriate notation to indicate positive and negative numbers
- Compares and order positive and negative numbers and locate them on a number line
- Develops algorithms for adding, subtracting, multiplying, and dividing positive and negative numbers
- Uses parentheses and rules for the order of operations in computations

- Understands and applies the Commutative and Distributive Properties
- Uses positive and negative numbers to model situations

Standard 7: Analyzes the properties of two and three dimensional figures (Filling and Wrapping)

- Develops strategies for finding the volume and surface area of objects
- Explores patterns among volumes of objects
- Designs and uses nets of objects to calculate surface area
- Investigates the effects on volume and surface area when varying dimensions
- Applies understanding of scale factor and its relationship to changes in 1, 2 and 3 dimensional measures
- Recognizes and solve problems involving volume and surface area

Standard 8: Solves probability problems using one or two stages (What Do You Expect?)

- Interprets experimental and theoretical probabilities and the relationship between them
- Distinguishes between equally likely and non-equally likely events
- Uses strategies for identifying possible outcomes and analyzing probabilities
- Determines if a game is fair or unfair
- Uses area models to analyze situations involving probability
- Determines the expected value of a probability situation
- Uses probability and expected value to make decisions

Grade 8 Mathematics Standards and Units

Standard 1: Solves problems in both mathematical and everyday contexts

- Defines problems with reason and insight
- Uses appropriate materials, tools, and techniques
- Solves with inventiveness and proficiency
- Identifies reasonableness of solutions
- Identifies errors and steps to correct them

Standard 2: Communicates mathematical thinking clearly and concisely

- Uses appropriate vocabulary
- Uses appropriate forms of representation
- Identifies the steps involved in problem solving

Standard 3: Represents linear relationships using equations, graphs, tables, and scenarios (Moving Straight Ahead, Thinking with Mathematical Models)

- Translates information about linear relations from one form to another
- Understands and calculate rate of change and slope

- Understands the meaning of and find the x and y intercepts of a line
- Uses slope and intercepts to sketch graphs of lines
- Writes equations in the form $y=mx+b$

Standard 4: Solves linear equations (Moving Straight Ahead, Thinking with Mathematical Models)

- Solves equations in one variable using tables, graphs, and symbols
- Solves equations using approximation and reasoning methods
- Connects solutions to equations to a table or graph of the equation

Standard 5: Recognizes and writes expressions for linear and non-linear patterns (Moving Straight Ahead, Thinking with Mathematical Models)

- Describes the patterns of change between independent and dependent variables
- Explores patterns among parallel and perpendicular lines
- Writes a linear equation when given specific information
- Uses data patterns to make predictions
- Fits a line to data that shows a linear trend
- Uses mathematical models to answer questions about linear relationships
- Explores and investigates situations that can be modeled by inverse variation relationships

Standard 6: Understands and applies the Pythagorean Theorem (Looking for Pythagoras)

- Understands the concept of square root geometrically
- Estimates the values of square roots
- Finds unknown side lengths of right triangles
- Develops strategies for finding the distance between two points
- Locates irrational numbers on a number line

Standard 7: Recognizes and writes expressions for exponential patterns (Growing, Growing, Growing)

- Recognizes the growth/decay patterns in tables, graphs, and scenarios
- Understands the meaning of growth/decay factors
- Relates growth factors to growth rates and percent change
- Determines and interprets the y-intercept for an exponential relationship
- Writes equations to express exponential patterns in tables, graphs, and scenarios
- Compares different exponential growth/decay patterns
- Compares exponential and linear relationships

Standard 8: Applies rules for working with exponents (Growing, Growing, Growing)

- Uses patterns in powers to develop rules for operating with exponents
- Becomes skillful in operating with exponents in numeric and algebraic expressions

Standard 9: Demonstrates and understanding of transformations, congruence, and

symmetry (Kaleidoscopes, Hubcaps, and Mirrors)

- Identifies figures with different types of symmetry
- Describes types of symmetry in terms of the images made by applying reflections, rotations, and translations to points of the original figure
- Uses transformations to construct figures with different types of symmetry
- Uses transformations to compare the size and shape of figures to see if they are congruent
- Specifies coordinate rules for transformations
- Identifies congruent triangles and quadrilaterals efficiently
- Uses properties of congruent triangles to solve problems about shapes and measurements

Standard 10: Solves equations and analyzes expressions including those involving grouping symbols (Say it with Symbols)

- Represents patterns and relationships in symbolic forms
- Uses the Distributive Property to write and interpret expressions
- Combines symbolic expressions using algebraic operations
- Solves linear equations with parentheses
- Solves quadratic equations by factoring
- Uses algebraic reasoning to write expressions